THE DENTAL PRACTITIONER

A monthly journal for the Practitioner and his Staff

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A Monthly Journal for the Practitioner and his Staff

(Incorporating the Proceedings of the British Society of Periodontology and the Official Supplement of the S.I.M.A.—Dental Laboratories Section)

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THE
DENTAL PRACTITIONER

A Monthly Journal for the Practitioner and his Staff

Vol. III, No. 3 November, 1952

EDITORIAL

SCALING THE HEIGHTS

A QUESTION has often arisen and been discussed by the profession which is of vital importance to everyone connected with dentistry. It is on the restriction of the dentist in public practice from performing the higher forms of dental treatment.

Since the advent of the National Health Scheme a vast amount of dentistry has been done for the general public and brought benefits to large numbers of people, but it has also brought great problems for the dentist. It has tended to force him to perform treatments that are of necessity simple and easy, and to leave the more complicated methods well alone with the reflection that even if he wished to do them, they would not be passed by the authorities. The *British Dental Journal* has pointed out the grave effects of this attitude on the student, who begins to wonder if the teaching of these higher techniques is justified. A leader in the *Manchester Guardian* on "The Art of Dentistry" rightly answers this with the remark, "This is not the attitude we expect from professional men".

Fortunately, this attitude is not too prevalent, and at least the student may be easily answered. But the wider issues may produce graver results, and to a certain extent this attitude could be rectified by the publication of a list of treatments that have been rejected by the authorities. It is not enough to know how many gold inlays, bridges, or dentures have been inserted by the profession; it is time we knew what percentage of gold inlays, bridges, and dentures have been refused and on what grounds. If the profession were informed of these facts the public would know what it could have, and the dentist would know what to ask for from the Ministry.

This journal is vitally interested in the standard of dentistry, and produces articles for the help of the profession on these aspects. We do not enter the field of politics, but it is felt that this question is too great to ignore and we would welcome letters giving details of treatments that have been refused, together with cases that have been accepted. Is this restriction and limitation of the higher forms of dentistry due solely to Ministerial policy, or due to the sheer bulk of dentistry that has been performed under the National Health Scheme? There are always two sides to any question, and if we are given some facts and figures we may be able to help everyone.

FRACTURES OF THE FACIAL SKELETON

(*Continued from page* 43)

By **N. L. ROWE**, F.D.S. R.C.S. Eng., L.R.C.P., M.R.C.S., L.M.S.S.A., H.D.D. Edin.
and **H. C. KILLEY**, F.D.S. R.C.S. Eng., L.R.C.P., M.R.C.S., L.M.S.S.A., H.D.D. Edin.
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Part II.—FRACTURES OF THE MAXILLÆ AND ZYGOMATIC BONES

ANATOMICAL CONSIDERATIONS

FRACTURES of the region of the face bounded by the frontal bone above, and the occlusal plane of the maxillary teeth below, are commonly referred to as "middle third" fractures of the facial skeleton.

Whereas the final position of the fragments in fractures of the mandible is primarily due to the direction of the fracture line and the influence of the attached muscles, these factors play very little part in fractures of the maxilla and zygomatic complex. The principal factor in determining the degree of displacement is the direction and force of the agent responsible for the fracture.

Although a superficial external survey may give the impression that the mandible and maxilla are relatively as strong as one another, a more detailed examination makes it immediately apparent that the fundamental architecture of these two regions is radically different.

a. The mandible is a freely movable bone, with a compact inner and outer cortical plate, and a well-developed cancellous central portion through which the inferior dental vessels and nerve pass. It is designed to provide a vertical and rotatory crushing force of approximately 200 lb. to the square inch for masticatory purposes.

b. The maxilla is ingeniously designed to resist the force of mastication, to absorb the shock of the occluding teeth, and distribute the load as evenly as possible over the cranial base. This is achieved by the arched shape of the palate, and the abutments of the maxilla against the fronto-maxillary, zygomatico-maxillary, and maxillary ethmoidal sutures. Posteriorly a strong buttress is provided by the junction of the pyramidal process of the palatine bone, and the pterygoid laminæ of the sphenoid bone. Some further support is provided in the nasal cavity by the vomer and vertical plate of the ethmoid, and the zygomatic bone itself redistributes the load to the frontal and temporal bones, via the zygomatico-frontal suture, and the junction of the temporal process of the zygomatic bone and the zygomatic process of the temporal bone.

Furthermore, the presence of the maxillary and ethmoidal air sinuses is responsible for the honeycomb type of formation which is best seen in a coronal section of the skull. The delicate laminæ which constitute the lattice framework are principally distributed in a vertical direction, thereby being alined along the line of principal stress.

From a consideration of the foregoing factors, it will be apparent that although the maxilla and zygomatic complex can resist a very considerable force applied in a vertical direction from below, force applied from anterior, superior, or lateral aspects will tend to shear off the whole complex from the cranial base. In the case of force applied from an anterior direction, the maxillæ are driven against the sloping incline of the body of the sphenoid, and the bones, together with the alveolar arches and teeth, are driven *en bloc* backwards and downwards. Such a type of injury, when viewed in profile, particularly after the initial œdema has subsided, shows a peculiar flattening of the face which is sometimes termed a "dish face" deformity.

Three other factors are also of importance in the consideration of maxillary injuries:—

1. Any gross disruption of the maxillary and zygomatic complex will fracture and displace

the elements of the nasal septum and nasal bones.

2. Comminution of the paper-thin bone of the orbital floor and medial wall of the orbit readily occurs. This, together with the backward and downward displacement of the central section of the middle third, often impairs the support of the eye. Diplopia occurs to a varying degree, and is most severe when there is associated rupture of the medial or lateral palpebral ligaments.

3. A shearing stress applied to the ethmoidal region results in comminution of the cribriform plate of the ethmoid, and provides direct access to the anterior fossa of the skull via the meninges. Consequently leakage of cerebrospinal fluid can take place, and this may appear running down the nose mixed with the blood. Although not always immediately apparent, it is easier to detect when the blood begins to congeal. On the other hand, the cerebrospinal fluid may pass posteriorly down the nasopharynx, and remain undetected unless the patient can be questioned for the presence of a salty taste when swallowing. More rarely, a fracture may occur through the base of the sphenoid, communicating with the sphenoidal sinus, and through a crack in the roof of this structure with the cisterna chiasmatica. In these cases a profuse and persistent cerebrospinal fluid rhinorrhœa occurs, and it is usually necessary for a neurosurgeon to carry out a fascia lata repair to arrest the leak. This is rarely necessary with injuries in the cribriform plate region, repositioning of the fractured maxillary complex usually resulting in an arrest of the flow of cerebrospinal fluid.

Fig. 1.—Le Fort's lines of maxillary fracture. White line, Low-level or Guérin type of fracture; Black line, Pyramidal type of fracture; Black-and-white line, High-level or suprazygomatic fracture.

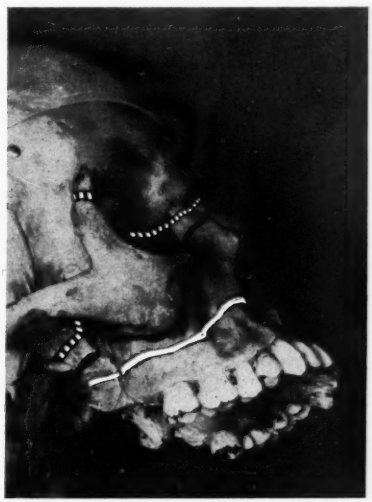

Fig. 2.—Le Fort's lines of maxillary fracture viewed from the lateral aspect to illustrate the relationship to the zygomatic bone and the pterygoid laminæ of the sphenoid bone.

TYPES OF FRACTURE

Fractures of the middle third of the facial skeleton may conveniently be subdivided into seven categories for practical purposes:—

1. Fractures of the nasal bones and frontal process of the maxilla.

2. Zygomatic or malar fractures:—

a. Fractures of the zygomatic arch.

b. Fractures of zygomatic–maxillary bones, with or without impaction into the antrum.

3. Unilateral fractures of the maxilla with one-half of the facial skeleton intact.

4. Low-level or Guérin type fracture, where the line of fracture passes just above the roots of the maxillary teeth, and detaches the tooth-bearing portion from the antra and nasal septum.

5. Pyramidal type fracture, the line passing through the lateral antral wall, at or close to the zygomatico-maxillary suture, continuing upwards across the fronto-maxillary sutures and junction of the nasal and frontal bones, and passing downwards in a similar manner on the other side.

6. High-level fractures, basically similar to the pyramidal type, with bilateral fracture of the zygomatic bones and arches. (*Figs.* 1, 2.)

7. Varieties of (4), (5), and (6) associated with a median split separating the maxillæ. This split usually results from a blow directed from above downwards. It may also occur from a blow beneath the chin when marked over-closure of the bite is present. The lower incisors which are in contact with the palate act as a wedge and split the maxillæ.

DIAGNOSIS

1. Fractures of the Zygomatic Bone and Arch.—These fractures provide a good illustration of the correlation between anatomy and signs and symptoms.

a. Extra-oral.—There is circumorbital ecchymosis, with varying degrees of bruising and swelling of the cheek. Subconjunctival ecchymosis is present, limited anteriorly by the cornea; posteriorly the limit cannot be defined as the blood has tracked forwards from deep within the orbit. Anæsthesia is present in the distribution of the infra-orbital nerve where the anatomical fracture occurs. The level of the eye drops because the zygomatic bone drops, and the orbital floor may be comminuted, with herniation of the orbital fat into the antrum. Clinically this usually results in diplopia.

Fracture of the lateral wall of the antrum fills the sinus with blood and unilateral epistaxis occurs. There may be temporary trismus and pain because the zygomatic bone or arch impinges upon the coronoid process of the mandible, and in severe cases actual mechanical locking may occur.

b. Intra-oral.—There is usually a variable degree of loss of sensation in the teeth because the fracture of the wall of the antrum severs the dental nerves.

Palpation in the buccal sulcus beneath the zygomatic buttress reveals an alteration in the contour as compared with the uninjured side. The main function of the zygomatic bone, in conjunction with the supra-orbital ridges, is to protect the eye from injury. Failure to reposition the depressed zygomatic bone and orbital floor will result in an increased liability of the eye to injury, possible perpetuation of the diplopia, and an ugly flattening of the affected side of the face.

2. Fractures of the Maxillæ.—It is as well to consider the possibility of a middle-third fracture in all cases of severe facial injury until proved to the contrary. In this way many such injuries will avoid being overlooked. As in the case of mandibular fractures, diagnosis consists of extra- and intra-oral examination.

a. Extra-oral.—

i. *Inspection* will often reveal a characteristic appearance a short while after injury, so that the majority of cases of severe injury to the middle third come to bear a close resemblance to one another. There is gross bilateral œdema, giving the impression of a "balloon" type of facies, together with marked circumorbital ecchymosis. Œdema of the eyelids rapidly develops, and if these are separated subconjunctival ecchymosis will usually be observed; often of a flame-shaped character, with the posterior limit of the effusion impossible to define as it disappears deep into the orbit. Such a type of ecchymosis is frequently described as pathognomonic of anterior fossa fracture, but this should be accepted with some reserve. It really implies a fracture of one or more of the orbital walls, with a resultant hæmorrhage which tracks forward under the conjunctiva, and equally well occurs with fracture of the lateral wall in zygomatic fractures.

The nares are usually filled with blood-clot and a close inspection should be made for the presence of cerebrospinal fluid. The external auditory meati should also be inspected for the

presence of blood and cerebrospinal fluid. The normal routine for cases of suspected head injury should also be followed with careful attention to the pupillary changes if present, slowing of the pulse, elevation of the blood-pressure, etc. The orbital movements should be checked in all directions, and particular note made of any evidence of diplopia.

In all cases a full examination of the cranial nerves and reflexes should be carried out.

ii. *Palpation* should commence on the medial aspect of the supra-orbital margins, and follow the rim of the orbit round until the medial aspect of the infra-orbital margin is reached. Particular note should be made of step defects in the infra-orbital margin, as this is the site through which the fracture lines nearly always pass. Careful note should be made of any irregularity or pain on pressure. The prominence of the zygomatic bone and the length of the zygomatic arch should be palpated, and it is then convenient to follow the normal procedure for examination of the mandible, commencing at the condyle. Finally the nasal bones should be examined for displacement and fracture.

iii. *Anæsthesia*: The infra-orbital nerve is usually damaged at the foramen or within the infra-orbital canal, and in this case anæsthesia will be present on the cheek, upper lip, teeth, and part of the oral mucosa. It is also wise to examine at the same time for any evidence of facial palsy although this, when present, is usually due to bruising of the peripheral branches.

b. Intra-oral.—

i. *Inspection* may show a complete absence of blood-stained saliva, as it is possible for complete detachment to occur without the fracture being compound into the mouth. There is usually some degree of ecchymosis, which should be looked for in the upper buccal sulci, near the zygomatic prominences. The alinement and integrity of the teeth should be closely examined, and the contour of the arch observed. The patient should be asked to close the teeth, and it will usually be apparent that there is gagging of the bite in one or both molar regions, as a result of the downward and posterior displacement of the maxilla. In extreme cases it will appear as if the patient cannot open the mouth more than about half an inch, and it should be clearly appreciated that this is due not to trismus or mechanical limitation, but to the fact that the mandible is already gagged open almost to the maximum by the downwardly displaced maxilla. It is also true, however, that limitation of movement may be due to a zygomatic arch fracture, impingeing upon the coronoid process.

ii. *Palpation* should commence in the upper buccal sulcus. Some alteration in contour at the junction of the maxilla and zygomatic bone may be present and the lateral wall of the antrum is frequently comminuted. The fingers of one hand should be placed on the occlusal surfaces of the teeth, or in the palate, and the finger and thumb of the other hand should grasp the bridge of the nose near the fronto-maxillary and naso-maxillary junctions. Upward movement should be made from within the mouth, and the mobility of the middle third will then be apparent. Unless this bimanual technique is employed, a false positive sign may be elicited by the action of the scalp rotating over the cranium, particularly if the patient is unconscious or anæsthetized, when the muscular tone is diminished. Finally an attempt should be made to spring apart the two halves of the maxilla, as a median fracture along the suture line is a not uncommon finding.

iii. *Anæsthesia*: The mucosa and teeth may be anæsthetic to a varying extent, owing to the interruption with their nerve-supply.

iv. *Percussion* of the maxillary teeth is a useful confirmatory sign. In cases of fracture of the maxilla, the normal resonance on percussion of the antrum is replaced by a sound likened to that obtained when a cracked tea-cup is struck.

Radiological Investigation

As in the case of mandibular fracture, there are certain views which are essential to diagnosis.

1. The Occipito-mental or Sinus View.—This is without doubt the most useful single view, whereby the lines of fracture may be traced following the course which has previously been

described. In addition, opacity of the various sinuses due to effusion of blood should be carefully observed, and particular note made of the lateral and medial walls of the antra. The infra-orbital margin and continuity of the zygomatic arch should be carefully examined. Fracture of the zygomatic bone usually takes place at one or all of three points:—

a. The zygomatico-frontal suture.

b. The zygomatico-maxillary suture.

c. The junction of the zygomatic and temporal processes of the arch.

2. The 60° Occipito-mental View.—This view possesses the added advantage of throwing the infra-orbital margin and the zygomatic arch into greater relief, and assists in assessing the degree of displacement in these regions.

3. The True Lateral View of the Skull.—If this view is obtained, centred on the maxilla, attention should be directed to the possibility of a fracture line immediately above the apices of the teeth, and a fracture line passing from the nasion backwards to the origin of the pterygoid laminæ from the sphenoidal base. Separation from the cranial base usually occurs along one or both of these two lines. The degree of retroposition of the skeletal elements can also be estimated.

4. The Occlusal View of the Maxilla.—Fractures of the alveolar portion or midline splits of the maxilla are best seen by this view.

5. The Dental Film.—This small film, with its high degree of definition, is of value for determining whether fracture of the apex of a root has occurred, and for deciding whether an alveolar fracture involves a particular tooth.

6. Routine Skull and Cervical Spine Views.—In practically every case it will be advisable to consider taking one or both of these views to eliminate the possibility of associated fractures.

TREATMENT

In the early stages the case may have to be considered as a neurosurgical problem and conducted accordingly. Some degree of concussion and cerebral irritation is to be expected, but on the whole such cases travel well.

General Treatment

1. Hæmorrhage.—Hæmorrhage and soft-tissue laceration are often conspicuous by their absence, and it is the exception rather than the rule for gross soft-tissue damage to occur. It is indeed surprising that so much skeletal damage can take place in the absence of soft-tissue trauma unless the peculiar distribution of the stress in the middle third of the face is appreciated, in the manner previously outlined under anatomical considerations. On the other hand, in gunshot wounds of the maxilla hæmorrhage may be severe and difficult to control, and such cases are liable to develop secondary hæmorrhage.

2. Respiratory Embarrassment.—Although this factor is not of such importance as that outlined in certain mandibular fractures, nevertheless considerable posterior and downward displacement of the soft palate may occur, and the nares are almost invariably filled with blood-clot. If such respiratory difficulty should occur, it can often be considerably relieved by the passage of a nasopharyngeal tube well lubricated with decicain ointment.

3. Shock.—The extent and degree of associated shock appears to vary considerably, and each case must be assessed upon its own merits. However, a careful balance must be maintained between the necessity of restoring the fluid balance and the risk thereby of increasing the intracranial tension. The patient is best treated by nursing with the head of the bed raised, provided that gross shock and hypotension do not coexist. A half-hourly pulse and frequent estimations of the blood-pressure should be instituted, and the general procedure for nursing a case of head injury observed. Several cases of so-called cerebral irritation have proved to be subconscious disturbance from an overful bladder.

4. Prophylactic Measures.—Apart from the usual measures outlined in the case of fractures of the mandible, it must be fully appreciated that systemic penicillin does not penetrate the meningeal barrier to any appreciable extent. This is a most important factor in this type of injury, where cerebrospinal fluid

leakage and ascending infection of the meninges may occur. Fortunately this disadvantage of penicillin is not shared by the sulphonamides, and all cases should be placed on a full prophylactic course of sulphadiazine or sulphatriad from the outset. In many cases, of course, this will have to be administered by intramuscular injection in the early stages when the patient is unconscious. This is yet another reason for close attention to the factor of fluid intake with regard to the prevention of crystalluria.

5. Pain.—Morphine must never be given until all risks of cerebral complications have been eliminated. To depress further the respiratory centre and mask the pupillary changes by inducing a morphine miosis is to invite disaster. One of the most useful drugs for cerebral irritation is intramuscular paraldehyde in 3–5-c.c. doses.

Local Treatment

First Aid.—Such measures as supporting bandages are of little or no value. Careful judgement is needed in cases of respiratory embarrassment where a coexistent mandibular fracture is present, before wiring the mandibular and maxillary teeth to one another, as the pull of the mandible may serve to distract further the maxillary fracture from the cranial base. In cases of midline splitting of the palate with displacement, a wire may be passed around the teeth on either side of the split, in the incisor region, and the fragments approximated. Where only posterior teeth exist, wires may be twisted around the teeth, but with the free ends on the palatal aspect; and the ends then tied across the palate. Better still is to employ eyelet wires with the eyelets on the palatal aspect, and reduce the displacement with tie wires. When the general condition of the patient has improved, and there is no risk of neurological complications developing, it is advisable for the patient to be transferred for special treatment, if facilities do not exist locally.

Advanced First Aid.—In the absence of readily available facilities, e.g., under battle conditions with long lines of communication where the journey to a Base hospital will of necessity be prolonged, certain other procedures can be adopted.

An upper dental impression tray should have the handle removed and a projecting bar of $\frac{1}{8}$-in. German silver rod soldered to it in the central incisor region. The tray is filled with softened impression composition, and placed in the mouth, being firmly pressed home into the upper teeth. When set, the anterior projecting bar is connected to a similar bar on a plaster-of-Paris headcap, by a vertical connecting rod and universal joints. Where universal joints are not available, two rods should be soldered to the sides of the tray, brought forward out of the corners of the mouth, and bent back to follow the outer aspect of the cheek closely. The bars should be cut off just short of the ear. The impression composition procedure is performed as before, and the maxilla elevated against the cranial base by bandages, or elastoplast or elastic bandage passing under the projecting side arms and over the top of the head. Neither of these procedures is very comfortable, and should only be adopted where specialized treatment is not available.

Specialized Treatment.—

Where the Patient cannot be moved.—Under certain circumstances the patient is unable to be moved to a special unit within a reasonable period. Such cases may arise as a result of the cerebral condition, or the presence of associated injuries such as multiple fractures elsewhere, fractured femur in extension on a Balkan frame, etc. Where it is desirable to provide immobilization of the maxilla, and facilities for splint construction in a dental laboratory are not available, e.g., forward areas in time of war, a very satisfactory method is available.

An arch wire, of $\frac{1}{8}$-in.-diameter half-round German silver wire, is contoured to the arch of the lower teeth and secured to the teeth by 0·35-mm. stainless steel wire. Two circumferential wires are passed around the lower border of the mandible in the manner described for mandibular fractures. These wires take a securing turn around the arch wire before being twisted together. Interdental eyelet wires are placed in strategic positions

in the maxillary arch, and tie wires from the maxillary eyelets to the mandibular arch wire used to immobilize and articulate the mandible to the maxilla. A heavy-gauge spinal needle is passed through the cheek from the exterior, being inserted outside the line of vision below the zygomatic prominence, and being directed

Fig. 3.—The technique of introducing a cheek wire with the aid of a spinal needle. The needle is shown in the correct position, outside the line of vision, the point having passed through the loop on the upper splint. The stylet is partly withdrawn, and will be replaced by the 0·5-mm. soft stainless steel wire prior to removal of the needle, the lower end of the wire being secured by an artery forceps.

downwards and inwards to emerge within the mouth at the point where the circumferential wires are tied over the arch wire (*Fig.* 3). The stylet is withdrawn, and a length of 0·5-mm. stainless steel wire threaded through the needle lumen. The wire is secured at the lower end, and the needle withdrawn, leaving the wire in position through the cheek. The lower end is then threaded under the arch wire and the circumferential wire, and twisted upon itself. The upper end of the cheek wire is attached to a suitable $\frac{1}{8}$-in. wire frame, which is partially embedded in a plaster-of-Paris headcap. An assistant pushes upwards the mandible from below, thereby elevating and supporting the maxilla and mandible as one intact unit against the cranial base. The slack in the cheek wires is then taken up, thus securing the maxilla in a stable position. A good result may be obtained by this means without having to resort to further treatment.

Definitive Treatment

Fractures of the Zygomatic Complex.—The following methods are principally used:—(1) Elevation from a temporal approach;

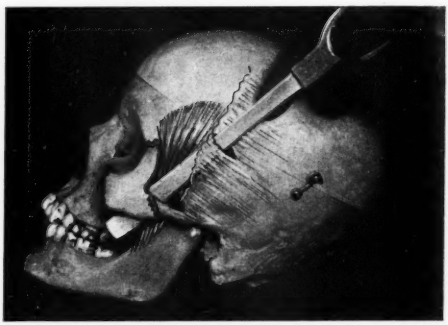

Fig. 4.—A model demonstrating the Gillies method of elevation of a zygoma by the temporal approach.

(2) Elevation and packing of the antrum; (3) Elevation and direct wiring of the zygomatico-frontal suture; (4) Elevation and pin fixation.

1. Elevation is easily achieved by the Gillies method. A small incision above the hair line cuts through the skin and temporal fascia, and an elevator of the Bristow type is introduced downwards under the arch and buttress of the zygoma. It is then utilized to lever out and elevate the depressed bone (*Fig.* 4). In cases of recent injury this procedure is usually successful and the fragments remain impacted if care is taken to prevent the slightest post-operative pressure overlying the bone.

2. Where gross comminution of the orbital floor exists, repositioning and stability of the zygoma may be achieved by a Caldwell-Luc approach to the antrum and the insertion of a paraffin flavine pack of ribbon gauze. Some operators prefer to use Whitehead's varnish and ribbon gauze in a similar manner.

Where this method has to be combined with elevation of the maxilla, the maxilla must be reduced and stabilized before attempting to pack the antrum. Otherwise, the maxilla is packed downwards as much as the orbital floor is packed upwards. Even worse, the antrum will be overpacked in this way, and

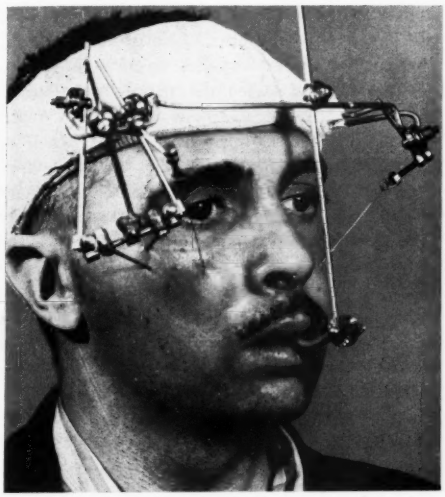

Fig. 5.—Fracture of the maxillæ treated by fixation to a plaster-of-Paris headcap. This has been achieved by cheek wires and an anterior vertical rod secured to the maxillary splint by an anterior projecting bar and universal joint. A comminuted fracture of the right zygomatic bone is maintained in position by pin fixation.

when the maxilla is elevated upwards during reduction, the antral floor will push the pack, which is over-large, up against the orbit, cause proptosis and intra-orbital pressure, with the grave risk of optic atrophy taking place subsequently. The pack should be removed after ten days.

3. In severe displacements, or where re-fracture has to be performed, the usual method may also be combined with an open reduction and wiring of the zygomatico-frontal suture, assisted where necessary by pressure on the antral surface from a Caldwell-Luc approach.

4. Similarly, or where gross comminution has occurred, it may be necessary to stabilize the bone by pin fixation, and extra-skeletal fixation to a plaster-of-Paris headcap. (*Fig.* 5.)

Fractures of the Maxilla.—To obtain the most favourable results the services of skilled dental technicians and the use of a properly equipped laboratory are essential. Cast-silver cap splints are constructed, with small loops

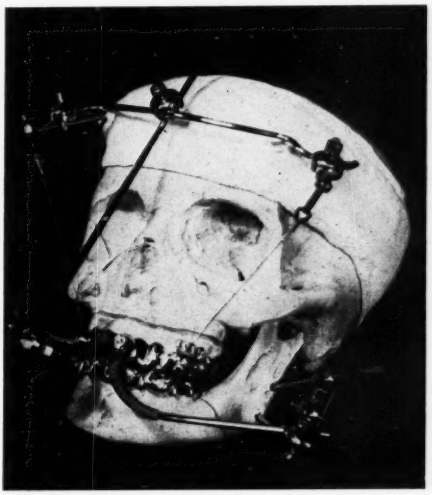

Fig. 6.—A low-level fracture of the maxillæ, which has been immobilized and controlled by cheek wires and an anterior vertical rod attached to the maxillary splint.

The control of an edentulous posterior fragment in the mandible is effected by two stainless steel pins attached by an extra-oral bar to the lower splint. Note the rubber tubing protecting the lips, and the universally adjustable headcap attachments for the cheek wires.

soldered to the upper edge of the maxillary splint in the premolar area. In the incisor area a detachable locking plate is constructed, held by two small screws, and soldered at right angles to the surface of this plate is a projecting bar of $\frac{1}{8}$-in. German silver rod. A mandibular splint is also constructed. The splints are cemented on to the teeth before operation, and a plaster-of-Paris headcap is applied, to which a projecting framework is added (*Figs.* 6, 7).

In those cases where the fracture is *unilateral*, fixation to a plaster-of-Paris headcap is not necessary. The fractured portion is

secured to the normal side by locking plates and a connecting bar, in a similar manner to that employed in mandibular fractures.

The routine procedure where applicable is to reduce any zygomatic fracture present, the overlap of which might prevent the maxilla from being brought forwards. The maxilla is

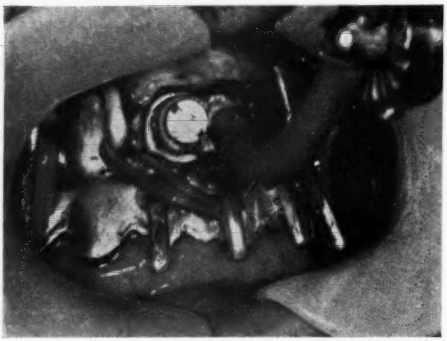

Fig. 7.—A close-up view of the splints used in *Fig.* 5. The anterior projecting bar is secured to the upper splint by means of a two-screw locking plate, and maxillary/mandibular fixation achieved by means of elastic bands. Note the covering of the bar with rubber tubing to prevent ulceration of the lip by electrolytic action.

rocked free by gripping with two Walsham's nasal forceps, one blade being placed along the nasal floor, and one over the palate, on either side of the nasal septum. In certain cases of the low-level or Guérin type the maxillary alveolus in the incisor region should be gripped with lion bone forceps, and disimpaction carried out. Cheek wires are passed as previously described, and attached to the loops on the upper splint. These wires are attached to the headcap frame via a specially designed universally adjustable attachment, and anterior support is provided by the projecting bar, which is attached by a vertical rod and universal joints to the headcap frame. (*Fig.* 5.) The axis of traction of the cheek wires should be carefully adjusted to ensure that no subsequent cutting through of the soft tissues occurs. If indicated, any antral packing is then carried out. Finally the septum and nasal bones are reduced with Walsham's and Asch's forceps, and the fragments stabilized either with a through-and-through mattress suture of stainless steel wire tied over rubber tubes or lead plates, or by a plaster-of-Paris slab from the headcap. The mandible is then immobilized to the maxilla with elastic bands via the hooks cast on to each splint. (N.B.—Remove throat pack before this stage.)

Duration of Fixation.—Fractures of the middle third unite at approximately double the speed of mandibular fractures. It would perhaps be more accurate to say that they become firm at twice the speed, since union is initially fibrous. Osseous union does occur provided accurate apposition takes place of the bone ends, but the complex laminar structure of so many of the bones and air sinuses renders this unlikely. The fractures are quite firm in three weeks, and it is therefore all the more necessary that treatment is not unduly delayed. Where possible, treatment should be given within three days of injury. Oral hygiene and diet are similar to those outlined for mandibular fractures, and the site of the cheek wires should be watched for the development of sepsis or cellulitis. This does not occur when skilled techniques are employed. In some units, the anterior projecting bar is attached to the mandibular splint, and the mandible employed as a platform against which the maxilla is elevated into position. Certain risks, such as distraction of the condylar heads and a false occlusion, may occur by this method.

COMPLICATIONS

As has already been said, the purely mechanical reposition of the maxilla will have a beneficial effect upon arresting the leakage of cerebrospinal fluid, and the presence of such a leak is not considered a contra-indication but rather an indication for treatment.

The principal complications of middle-third fractures may conveniently be classified as cranial, orbital, nasal, antral, dental, and general.

1. Cranial.—Headaches and varying degrees of cerebral irritation and mental disturbance commonly occur. These are generally transitory in nature, but occasionally post-traumatic headaches may persist for a considerable period of time and damage to the frontal lobes

may result in personality changes of a permanent nature. An unusual complication which has been observed was the development of a pneumatocele as a result of an associated fracture through the frontal sinus communicating with the anterior fossa and frontal lobe. Rupture of the branches of the olfactory nerve as it passes through the cribriform plate of the ethmoid bone results in anosmia, and some degree of permanent impairment of the sense of smell is a sequel. The third, fourth, and sixth nerves are not infrequently involved either in their intracranial or extracranial course, but recovery usually takes place during the first few weeks. Occasionally permanent damage may require the attention of the ophthalmic surgeon. More rarely the seventh, eighth, and twelfth nerves may be involved in associated fractures of the cranial base.

2. Orbital.—Inadequate reduction and failure to aline the orbital floor may also result in diplopia. Minor degrees of this type of diplopia may subsequently be compensated for by the patient, but a gross displacement will necessitate operative repositioning of the orbital floor by the insertion of a bone-graft. As mentioned previously, direct damage to the third, fourth, and sixth nerves may occur within the orbit. The optic nerve is protected by a dense bony ring and is seldom involved, but untreated cases with marked depression of the orbital floor may occasionally result in secondary optic atrophy.

Involvement of the nasolacrimal duct in the fracture may result in obstruction and subsequent epiphora which will necessitate a dacryocystorhinostomy.

3. Nasal.—Deviation of the nasal septum may occur and infection of the paranasal sinuses may occasionally take place.

4. Antral.—Infection of the fracture hæmatoma may result in empyema of the antrum; occasionally an oro-antral fistula may persist.

5. Dental.—Inadequate reduction will result in an open bite deformity which may prove very difficult to treat other than by exodontia or maxillary osteotomy.

6. General.—Untreated cases of severe injury to the middle third of the face exhibit a flattening of the features and a mongoloid appearance to which the term "dish-face deformity" has been applied. The vertical height of the middle third of the face is increased and there is considerable lengthening of the features, associated with limitation of the vertical mandibular excursion.

TREATMENT OF DELAYED CASES

After two or three weeks there is often sufficient consolidation to render simple reduction impossible. The following methods may then be adopted:—

1. Exposure of the fracture site and re-fracture, followed by the normal methods.

2. Traction on the maxilla by means of attaching a cord to the anterior projecting bar on the maxillary splint. The cord is passed over a system of pulleys on a Balkan frame, and a 4-lb. weight attached. This may be reduced later to 2 lb.

3. Traction exerted by elastic bands, acting between a rigid framework embedded in a plaster-of-Paris headcap and stainless steel wires passed through the frontonasal process and attached to specially designed apparatus.

The authors would like to express their grateful appreciation to Sir Harold Gillies for much valuable criticism and advice in the preparation of this paper; to Miss J. E. Farmer, medical artist, for the diagrams illustrating eyelet wiring technique and elevation of the fractured zygomatic bone; and to Mr. E. B. Ferrill, of the Department of Medical Photography, for the clinical photographs.

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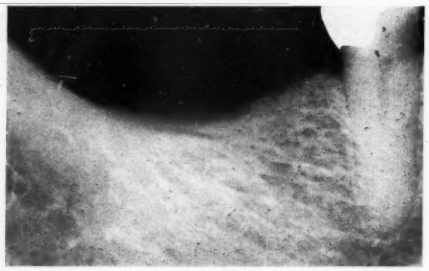
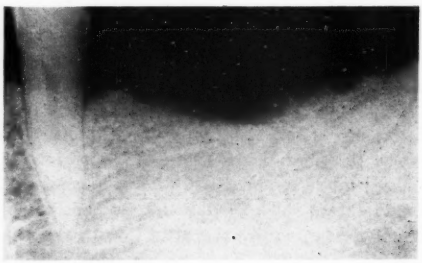
PLANNING AND DESIGN OF REMOVABLE PARTIAL DENTURES

(*Continued from page* 52)

By **COLONEL ARTHUR H. SCHMIDT**, U.S.A.F.R. (D.C.)



A



B

Fig. 33.—Constructing a lower removable partial denture.

A brief history of this case: A man, aged 54, in good physical health. The patient stated that to his knowledge he had never acquired his lower second or third molars.

The right abutment tooth (A) has a large gold occlusal filling, and from the X-ray the dense cortical bone and the periodontal tissues appeared in normal condition.

B, The abutment tooth on the left side has a large disto-occlusal gold inlay restoring the lingual cusp. The tooth and surrounding structures are in healthy condition.

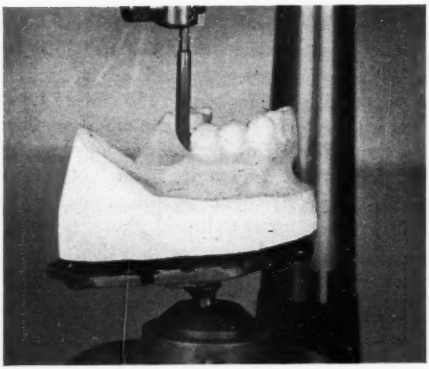


Fig. 34.—The model is attached to the tilting top of the survey table and the abutment teeth and involved tissue are "analysed" by bringing them into contact with the analysing rod.

The cast should be tilted experimentally to various angles, and the resulting undercuts tested with the analysing rod each time. The tilt that is ideal for clasping one of the abutments may make it impossible to clasp the other satisfactorily.

Reverse back-action clasps are indicated for this case, as the bicuspid abutments incline lingually, presenting very little undercut on the buccal of either tooth.

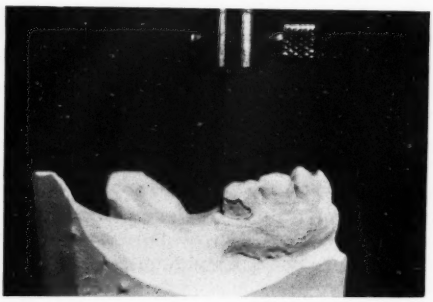


Fig. 35.—The tilt is decreased until a ·010 horizontal undercut is obtained with as much tooth covered on the distal as possible. A mark is made where the gauge head contacts the tooth. The gauge is removed and the carbon marker is put in the tool holder, and the spindle is raised and lowered keeping the carbon against the tooth. Marking the survey line with the side of the carbon and the base line with the sharp edge of the carbon marker.

Fig. 36.—The right first bicuspid showing the top or survey line on the tooth, the centre line, or gingival clasp line around the distal of the tooth, and the base undercut line across the ridge distal to the abutment tooth, and the undercut area present on the buccal surface of the stone model.

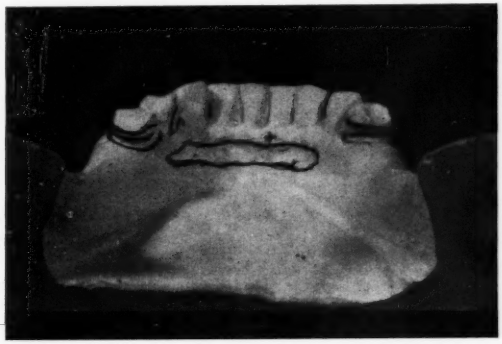


Fig. 37.—A lingual view of the model clearly showing the three lines on the distal of the abutment teeth. Also observe a slight undercut marked out on the lingual of the left first bicuspid, and also the undercut area present above the anterior floor of the mouth.

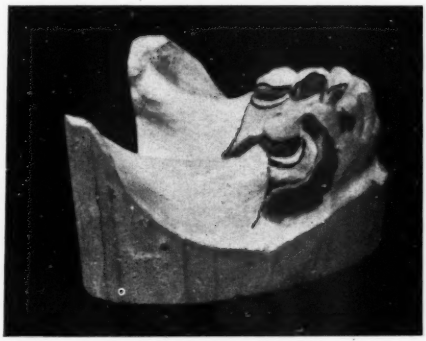


Fig. 38.—Draw the outline of the saddles, bar, and clasps in accordance with the survey lines obtained. Undercut wax is applied to each abutment tooth to establish the clasp seat, and also to establish a seat for the connecting bar from the clasp on the buccal to the saddle.

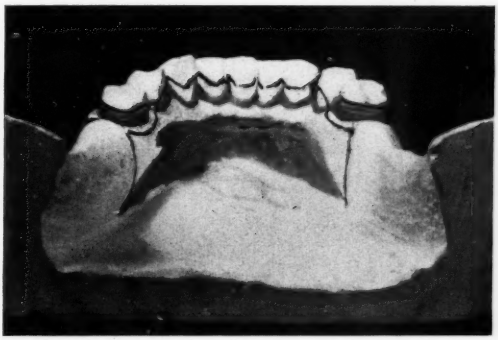


Fig. 39.—A lingual bar wax form is placed on the stone model and outlined with a pencil. The base outline facilitates the placing of the undercut wax and the forming of a slight shelf for correct positioning of the wax bar on the investment cast. Fill the gingival crevice around the lingual of all anterior teeth and fill in any undesirable undercuts.

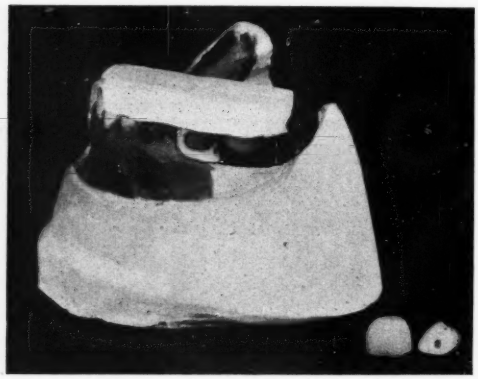


Fig. 40.—The master model is now duplicated in casting investment, and the investment cast is treated with the hot beeswax. This is the waxing for an all-metal porcelain case and shows the master model with the two thicknesses of 30-gauge wax over the saddle area. Grind the tube teeth to the ridge and undercut waxing, and check the occlusion and articulation of the case.

After the tube teeth are ground in, lubricate the occlusal surface of the adjacent teeth and pour a plaster core over the top of all teeth involved, forming a matrix, that will make it possible later on to position the tube teeth correctly on the investment cast.

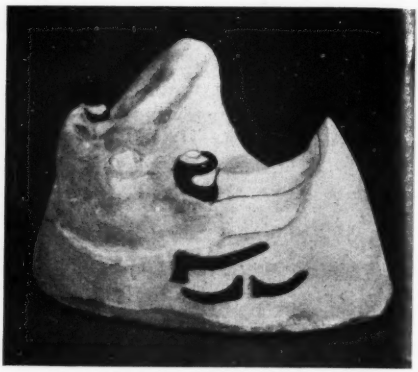


Fig. 41.—The tube teeth are prepared for boxing, the post hole is countersunk with a tapered stone, and a 45° bevel, about 1 mm. wide, is ground completely around the gingival edge of each tooth.

A large back-action wax form shown at the base of the cast was used for the bicuspid abutment. Adaptation is started at the mesio-buccal on the tooth and bending it over into its seat. Using a pencil eraser, gently force the form against the shelf.

The occlusal rest on the distal is built up and attached with a small amount of wax and a hot spatula.

The connecting arm of the reverse back-action clasp is made of half of a large No. 1 wax form curved to the proper shape.

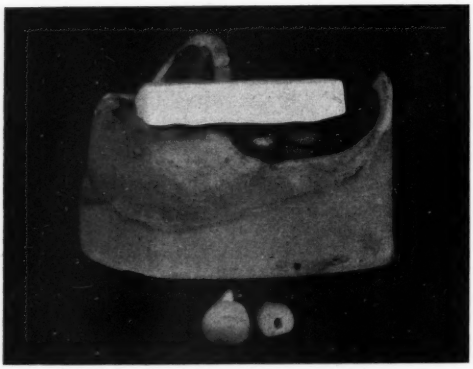


Fig. 42.—Preliminary to placing the tube tooth, one thickness of 30-gauge wax was adapted to the cast and trimmed to the saddle outline. Since the tooth was ground with clearance to accommodate two thicknesses of 30-gauge wax, there remains space for the additional thickness which is required for boxing each tooth.

The boxed tooth is reseated on the occlusal cone and carried to place on the investment cast. This eliminates the necessity of mounting the investment cast on an articulator to obtain the correct relation.

The boxing is then sealed to the saddle and where more than one tooth is supplied, each tooth should be formed and waxed to the saddle one tooth at a time. A second sheet of wax, to produce the desired thickness of saddle, is now adapted around the neck of the tooth and to the outline of the saddle.

The wax bar form is adapted and two thicknesses of 30-gauge wax extended upon the lingual surface of the anterior teeth.

Fig. 43.—In waxing a case for acrylic saddles, the clasps and bar are placed as in the previous case, utilizing the retention of the wax lingual bar form.

For added retention of base material and to obtain a neat finish line on the buccal, take a wax palatal bar form and cut it as illustrated, using the centre section.

Polish the wax pattern, sprue and invest for casting.

A convenient and efficient method of burnout is to increase the heat gradually over a period of one hour until the sprue hole is dull red, and continue heating at dull red for at least one-half hour more. Care should be taken to avoid heating the investment above 1300° F. or a dull red, because at higher temperatures the calcium sulphate in the investment breaks down and gives off a corrosive gas which is frequently the cause of pits and gas blowholes in the casting. Sulphides are also deposited on the surface which are very difficult to pickle off.

FLUORINE AND DENTAL CARIES

By **CHARLES DILLON**, D.D.S., L.D.S.

In a previous paper (Dillon, 1950) on "The Chemistry of Fluorides and its Application to Dental Practice", reactions between soluble fluorides and calcium salts were discussed. These reactions could be related only to topical applications of fluorides, although the discussion was extended to certain aspects of the problem of fluorination of water supplies. But because of the high concentrations used in the reactions, they would not necessarily relate to reactions arising from the fluorination of water supplies where concentrations would be in the region of 1–2 p.p.m. fluorine.

As a basis for the following experiments the paper by Smith and Smith (1937) on "Bone Contact removes Fluorine" was studied.

REACTIONS AND REAGENTS

The following series of tests shows the reactions occurring in very dilute solutions within the limits of the solubility of the comparatively insoluble calcium salt of fluorine and where this salt may be considered to be in the ionized state. *The reacting solid in this case was powdered teeth or bone.*

0·5-g. quantities of powdered teeth were shaken with:—

1. 500 ml. sodium fluoride solution (5 p.p.m. fluorine).

2. 500 ml. of 5 p.p.m. sodium fluoride solution to which was added calcium chloride, so that the resulting solution contained 50 p.p.m. of calcium.

3. 500 ml. distilled water.

The mixtures were allowed to stand for two days and then filtered, and 250 ml. of the filtrates, tested for fluorine content, gave the following results:—

No. 1. 3·5 p.p.m. fluorine;

No. 2. 0·5 p.p.m. fluorine;

No. 3. 1·9 p.p.m. fluorine.

Equal quantities of the filtrates were evaporated and tested for phosphates. Tests Nos. 1 and 3 gave *unequal* quantities—more in Test No. 1—of phosphomolybdate precipitates. Test No. 2 gave no discernible precipitate.

No attempts were made to determine accurately the amount of phosphate in these or in any of the subsequent tests. The precipitates, after standing several days, were packed down with the aid of a centrifuge and visual indications noted.

It was evident from the above that there were fluorides present in the powdered teeth which were extractable in water.

The recovered powders were allowed to dry in air and separately treated as in the initial test. The recovered quantities were added to 500 ml. of the fluoride solutions and distilled water.

After standing they were filtered and tested for fluorides, and showed:—

No. 1*a*. 2·9 p.p.m. fluorine;

No. 2*a*. 0·9 p.p.m. fluorine;

No. 3*a*. 0·8 p.p.m. fluorine.

The filtrates, when tested for phosphate, again showed similar ratios to the initial test. Test No. 2*a* had the least evident quantity of phosphates. Test No. 1*a* had the most.

The possibility of suppressing the phosphate solubility by the introduction of calcium chloride into Tests Nos. 2 and 2*a* was considered, and this form of test was given up in favour of a solution of calcium fluoride prepared from natural fluorspar and adjusted to contain 5 p.p.m. fluorine.

The following three tests were made with fresh portions of powdered teeth, 0·5-g. quantities being shaken with:—

4. 500 ml. sodium fluoride solution (5 p.p.m. fluorine);

5. 500 ml. calcium fluoride solution (5 p.p.m. fluorine);

6. 500 ml. distilled water.

After standing for a day the mixtures were filtered and tested for fluorine and phosphates:—

No. 4. 2·5 p.p.m. fluorine;

No. 5. 1·5 p.p.m. fluorine;

No. 6. 1·1 p.p.m. fluorine.

The ratios of the phosphate contents again showed the same results as the earlier tests,

Test No. 5 containing the least evident amount, No. 4 the most.

The powders retained on the filters were separately washed with 1 per cent sodium hydroxide until 250 ml. had been collected, and the fluorine determined in these washings with the following results:—

No. 4*a*. 3·5 p.p.m. fluorine;

No. 5*a*. 4·5 p.p.m. fluorine;

No. 6*a*. 2·5 p.p.m. fluorine.

These figures do not represent absolute amounts extractable, but indicate the proportion washed out with equal volumes of sodium hydroxide and in approximately the same time. The value of 2·5 p.p.m. fluorine in Test No. 6*a* represents an amount removable from the powdered teeth in addition to that extracted by distilled water.

In order to determine whether the phosphate taken into solution increased with increasing amounts of sodium fluoride, tests were carried out in accordance with the general plan, using powdered teeth with sodium fluoride solutions containing 5, 15, and 50 p.p.m. of fluorine. *The filtrates were tested for phosphates and showed a proportionate increase with the amounts of fluorine present.*

In view of the fact that the specimens of powdered teeth and bone contained fluorine which was extractable to some extent in water, an attempt was made to remove the fluorine by washing the powder in sodium hydroxide solution. As a preparatory step, the solubility of natural calcium fluoride in 1 per cent sodium hydroxide was determined, and the value of 11 p.p.m. fluorine was obtained. This showed an increase over the generally accepted 8 p.p.m. in water.

About 2 g. of a mixture of powdered teeth and bone were shaken with a litre of 1 per cent sodium hydroxide solution filtered after some hours' standing and washed with water. The powder was then suspended in water, and the remaining trace of soda neutralized with dilute hydrochloric acid, and finally filtered, washed, and allowed to dry in air. The fluorine content of this powder was determined and found to be 0·04 per cent, but it was thought that the surface fluorine had been removed from the particles.

0·5-g. quantities of the powder were shaken with:—

7. 500 ml. sodium fluoride solution (5 p.p.m. fluorine);

8. 500 ml. calcium fluoride solution (5 p.p.m. fluorine);

9. 500 ml. distilled water.

The mixtures were filtered after some hours' standing, and the filtrate was tested for fluorine and gave results as follows:—

No. 7. 2·1 p.p.m. fluorine;

No. 8. 1·4 p.p.m. fluorine;

No. 9. 0·3 p.p.m. fluorine.

Again, on testing for phosphates the least evident amount was in the calcium fluoride solution (Test No. 8), and the most in Test No. 7.

The filtered powders were then separately suspended in 500-ml. quantities of 1 per cent sodium hydroxide solution for two days, filtered, and the filtrates tested for fluorine. These showed:—

No. 7*a*. 2·8 p.p.m. fluorine;

No. 8*a*. 3 p.p.m. fluorine;

No. 9*a*. 1·5 p.p.m. fluorine.

Test No. 9*a* showed that fluorine was still being extracted from the powder, and this part of the investigation was terminated.

Discussion.—1. When sodium fluoride is brought into intimate contact with powdered bone and teeth, fluorine is deposited in the form of a salt progressively, and phosphate is displaced *also* progressively. If therefore fluorine ions reach the blood-stream in excess of calcium ions present, the fluorine will react with bone, and the result will be a serious disturbance of both calcium and phosphate metabolism. This condition is likely to be met with in many cases in natural water supplies containing fluorine, and where these conditions are fulfilled mottling of teeth and bone will be a common feature and of clinical significance. Whether the fluorine is deposited in bone as fluorappatate or merely as calcium fluoride, is not of much physiological importance, but from the increased solubility of the fluoride in bone, and that of calcium fluoride in sodium hydroxide, it would appear that the fluoride formed on the particles of bone is in fact calcium fluoride. In this connexion the work

of Scott (1952) is confirmatory. Scott found that enamel slabs immersed in 2–4 per cent aqueous solutions of sodium fluoride deposited progressively a crystalline substance identified by electron defraction as calcium fluoride.

2. Let us for the present assume that the method by which it is proposed that the water be artificially fluorinated should not result in an excess of fluorine ions over calcium ions originally present in the water, and therefore as far as artificial fluorination is concerned, it is with calcium fluoride, or rather fluorine ions balanced by calcium ions, that we are concerned. For, as has been shown at the outset, when calcium ions in excess are added to sodium fluoride in solution, the resulting ions in the presence of bone powder behave in the same way as calcium fluoride alone in complete solution in the presence of bone. The rapidity with which bone absorbs fluorine from calcium fluoride in solution would seem to indicate that if calcium ions balanced by fluorine ions are circulating in the blood-stream, these must first be deposited on the forming bone before the normal process of calcification or ossification can take place. From the evidence also it appears that after a while either the bone loses its powers of attraction or the fluorine gives up its charge and is then able to return partly to solution, but despite this, when bone already containing 400 p.p.m. F. is confronted with freshly ionized calcium fluoride, it is able to absorb it progressively.

Although calcium fluoride is less toxic than sodium fluoride, owing to the rapidity with which it is progressively absorbed, it must remain a potential source of embarrassment to normal calcification and is liable to interfere in time with the normal functions of adult bone. The fact that an individual can carry a heavy load does not render the load any lighter; it is only a proof of strength.

The presence of bone or teeth depresses the solubility of calcium fluoride. The converse of this statement is generally accepted in the literature, viz., that fluorine lowers the solubility of bone and teeth. It is granted that this latter statement is not entirely erroneous but has led to erroneous generalizations.

If a tooth is soaked in a 2 per cent solution of sodium fluoride, it does show an apparent decreased solubility and an increased resistance to the action of acids. But in the case of a natural deposit, due to the internal ingestion of fluorides, the deposit is laid down in irregular strata and the tooth or bone shows no particular resistance to the acids of fermentation. A tooth which contains 500 p.p.m. fluorine will decalcify just as readily in lactic acid as another with only 200 p.p.m. fluorine. Clinical evidence confirms this observation.

SAMPLING AND DETERMINATION OF FLUORINE IN BONE AND TEETH

Teeth to be analysed were cut to a fine powder with a diamond disk or steel bur, after removing the soft carious matter with an excavator or bur. They were cut from the crown downwards towards the roots until 0·3 to 0·5 g. was collected. Where the crown was almost eaten away by decay, the cutting was continued towards the roots, taking a portion of the root dentine and cementum.

Place 0·3–0·5 g. powder into a Claisen flask (100 ml. capacity). Add a mixture of 40 ml. perchloric acid (60 per cent) plus 10 ml. water. Add about 0·1 g. silver sulphate. Fit a rubber stopper into the neck of the flask carrying a thermometer (to read at least up to 150° C.), and a narrow glass tube drawn to a tip at the inside end, so that the tip remains clear of the contents when boiling. Fit a rubber stopper to the open end of the distillation arm of the flask, and have the delivery tube bent vertically downwards and carrying a pierced rubber stopper which fits into the condenser held vertically. Connect a water supply to the narrow glass tube, so that water may be dripped into the flask as distillation proceeds. The bulb of the thermometer must be immersed in the liquid in the flask, so that the temperature is maintained at 135° C. by increasing or decreasing the amount of water dripped in.

Maintain a flow of water through the condenser as distillation proceeds and collect 200–250 ml. distillate.

To the distillate add a drop of phenolphthalein solution, and drop in 2 per cent sodium hydroxide solution until definitely pink and evaporate to 5–10 ml. Add 2 per cent hydrochloric acid drop by drop until colourless, then two drops 0·1 per cent alizarin-s (in water). Add an equal quantity of industrial methylated spirits to the concentrate, render acid with 2 per cent hydrochloric acid with 1 drop in excess. Titrate with thorium nitrate until a faint pink colour is produced.

Discussion.—If fluorination of water supplies is to be on a safe scientific basis, the first essential is to determine the minimum effective and maximum dose of the substance to be administered; and as the substance under discussion is

an accumulative poison, the most rigorous control over the dose to be taken must be exercised. Further, since fluorine is such a universal element, the amounts normally absorbed from other sources must be carefully assessed and controlled before the dose can be finally fixed.

After a tooth erupts, it can no longer absorb any further fluorine into the internal structure of the crown. We can therefore speak of the "fluorine age" of a tooth.

Decayed teeth, taken from patients who came for treatment, were analysed for their fluorine content. All the teeth except one depicted in the illustrations (*Figs.* 1–11) show extensive caries.

Fig. 1.—*Case* A. Man aged 26. Tooth examined $\overline{|7}$; mottling observed; p.p.m. F.1000.

Fig. 2.—*Case* B. Boy aged 4½. Teeth examined $\overline{D|DE}$; no mottling; p.p.m. F.440.

The declared purpose is to deposit fluorine in the teeth with a view to controlling the tendency of the teeth to dental disintegration.

Fig. 3.—*Case* C. Girl aged 12. Tooth examined $\overline{|6}$; no mottling; p.p.m. F.580.

Fig. 4.—*Case* D. Man aged 65. Tooth examined $\overline{7|}$; no mottling; p.p.m. F.690.

Therefore the dose actually to be determined is the percentage or parts per million of fluorine that the teeth must absorb to ensure that the widely publicized 40 per cent reduction in dental caries is achieved without harm to the rest of the body. The fluorine in the reservoir may be accepted as the medicine in the bottle.

The case in *Fig.* 4 shows a very high fluorine content. The man was brought up on the Island of Lewis on an almost daily diet of herrings. The herrings were stored in kegs and eaten throughout the winter months. He shows no sign of fluorosis, his store of fluorine being derived mostly from food. On the other hand, *Fig.* 1 exhibits a case of clinical fluorosis. It was elicited that as a boy he played amongst cryolite dust in the vicinity of the aluminium factory at Kinlochleven, but owing to improved housing conditions and tightened restrictions

Fig. 5.—*Case* E. Boy aged 6. Teeth examined $\overline{ED|DE}$; no mottling; p.p.m. F.300.

around the factory area and a knowledge of the dangers of playing in such dust, the incidence of fluorosis of this nature has been reduced and only isolated cases are now found.

As will be seen from the table and illustrations, a fluorine content of 112 p.p.m. to 580 p.p.m. in the teeth of adolescents does not protect the teeth from rapid and progressive dental caries. These children and adolescents, ranging from 4½ to 17 years, have already lost from 3 per cent to 32 per cent of their teeth, and this does not take into account the fact that there are multiple caries in each case in the remaining teeth. The salient feature is the wide range of difference in fluorine content over which advanced decay does occur. There is no inverse relationship here between the amount of fluorine in the enamel and dentine of teeth and dental caries.

It has been asserted with emphasis that the condition of a tooth as regards mottling acts as an additional control over the effects of fluorine in the water (as if indeed this was the only source of fluorine).

As an example of this kind of reasoning, the case-history of a man of 34 may be taken. This man came for the extraction of the lower left first premolar. It was observed that he had a bulging mass in the lower right jaw. He was X-rayed and a large cyst, extending to his ramus and involving three impacted molar teeth, was discovered (*Fig.* 12). At actual operation, considerable difficulty was experienced in removing the second molar (the first and most deeply impacted molar was left). When the tooth was divided it was discovered that the crown was so firmly cemented to the jaw that after burring away four-fifths of it,

Fig. 6.—*Case* F. Girl aged 8½. Tooth examined $\overline{|6}$; faint mottling; p.p.m. F.500.

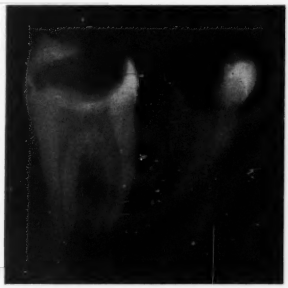


Fig. 7.—*Case* G. Girl aged 15. Tooth examined $\overline{1|}$; no mottling; p.p.m. F.245.

Fig. 8.—*Case* H. Boy aged 7½. Tooth examined $\overline{E|}$; p.p.m. F.408.

Fig. 9.—*Case* J. Boy aged 5. Tooth examined $\overline{|E}$; p.p.m. F.260.

Fig. 10.—*Case* K. Boy aged 17. Tooth examined $\overline{|6}$; no mottling; p.p.m. F.170.

Fig. 11.—*Case* L. Boy aged 17. Tooth examined $\overline{6|}$; no mottling; p.p.m. F.232.

in the end it had to be broken from the jaw with a strong elevator. The crown of the tooth with the jawbone attached is illustrated in *Fig.* 13, along with a section of the bone that was removed. Analysis showed that the lower left first premolar (fluorine age 6) contained 340 p.p.m. fluorine, while the jawbone contained 800 p.p.m. fluorine. Therefore, to say that the appearance of the teeth is an additional control as to what is going on in the skeleton as a whole is unsound.

Fig. 12.—Showing three impacted teeth and large cyst extending to the ramus.

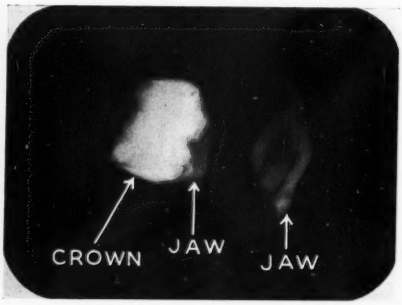


Fig. 13.—Showing crown of second impacted tooth with jawbone cemented to it and a section of jaw removed during operation.

The advocates of fluorination lay great emphasis on the care and precision with which the supply of fluorine in the water is going to be controlled. There is no doubt that this can be done. But what precisely is the reason for controlling the amount of fluorine in the water supply so meticulously to the nearest millegram while permitting the "medicine" to reappear on the table embodied in various foodstuffs to be consumed in unmeasured quantities? It should be the first duty of Public Health Authorities to ascertain by analysis what amounts are being taken in every item of food and drink. No data has been given of the fluoride content of the foods that come to this country from abroad. Fluorination is international in its implications, for if the regions from which we draw our foodstuffs decide to fertilize their pasture lands with rock-phosphate, containing a high percentage of fluorine, then the streams and runnels and water-holes and ponds will contain a high percentage of fluorine, and livestock, drinking from these sources, will be imported into this country as meat with a high fluorine content and soup made from the bones of these animals will contain a high percentage of fluorine. The fact that grass under these conditions will absorb only a limited and very small amount of fluorine is irrelevant. Then the weak, the sick, the aged, and those who have glandular disturbances may already be consuming more fluorine than is good for them. Yet again, what of the workers in industry who are exposed to fluorine during long working hours? It is possible that the addition of a little more to their water supply may tip the balance. Industry in its own defence should resist fluorination.

If the doctor prescribes a drug that is known to have an accumulative effect, he should always set a time limit to his medication, just in case the cure becomes worse than the disease. But when it comes to fluorination apparently it is the patient who must prove that the "medicine" is doing him harm.

SUMMARY AND CONCLUSIONS

1. It has been shown that there is a fundamental difference between the action of sodium fluoride and calcium fluoride upon bone. Sodium fluoride *reacts* with bone, displacing phosphate progressively while still in concentrations low enough to be completely ionized, while calcium fluoride does not react but is progressively absorbed. The presence of bone depresses the solubility of calcium fluoride

and there appears to be an attractive force between bone and calcium fluoride in the freshly ionized state, for although a certain amount of the calcium fluoride is progressively returned to solution from bone containing it, still bone is able to absorb more when fresh quantities of ionized calcium fluoride are brought into contact with it.

2. If a water supply containing calcium ions is fluorinated with sodium fluoride, then, depending on the amount of calcium ions present, the fluorine may reach the blood-stream in balanced proportions and behave towards bone as calcium fluoride, but if there are not sufficient calcium ions present in the water to balance the amount of sodium fluoride added, then the toxic effects attributable to sodium fluoride will be present to a degree.

3. Far from considering the problem of a dose which is to be deposited in the teeth, the advocates of fluorination have not even paid it the passing compliment of a nod, and even if they did nod in that direction the dose could neither be fixed nor controlled.

4. The accumulative effect of the "medicine" has not been adequately considered, nor can it be assessed without further specific studies directed to that end alone.

5. The presence of a widely variable amount of fluorine in decayed teeth does not support the view that a reduction in dental caries will result by increasing the amounts already being absorbed from other sources.

6. In this age of addition, if anything is wrong with a patient that is not fully understood the tendency is to seek the cause not among the harmful things that may be present but among the "good" things that may be absent. And so one supplement after another is added. The scientific possibility of *subtraction* apparently has occurred to no one.

FURTHER DETAILS AND SUMMARY OF RESULTS

	Case A	*Case* B	*Case* C	*Case* D	*Case* E	*Case* F	*Case* G	*Case* H	*Case* I	*Case* J	*Case* K	*Case* L
Teeth analysed	$\underline{\lvert 7}$	$\overline{\text{D}\lvert\text{DE}}$	$\overline{\lvert 6}$	$\underline{7\rvert}$	$\overline{\text{ED DE}}$	$\overline{\lvert 6\text{E}}$	$\frac{7\rvert}{\lvert 5}$	$\overline{\text{E}\rvert}$	$\overline{\text{E}\rvert}$	$\overline{\lvert\text{DE}}$	$\overline{\lvert 6}$	$\underline{6}$
Age of patient	26	4½	12	65	6	8½	15	7½	5	5	17	17
Fluorine age of Tooth . .	6	1–2	6	6	1–2	6	6	2	2	1–2	6	6
Teeth missing at examination	$\frac{64\lvert 4}{6\lvert 67}$	None	$\overline{6\rvert}$	$\frac{863\lvert 2678}{76\lvert 567}$	None	$\frac{\text{D}\lvert\text{DE}}{6\lvert\text{D}}$	$\overline{6\lvert 6}$	$\overline{\lvert\text{E}}$	None	None	$\frac{74\lvert 26}{765\lvert 6}$	None
Percentage loss of Teeth in age group . .	19	15	7	—	25	29	14	10	5	10	32	3
Existing caries	Multiple	Multiple	Multiple	Paradontal	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple	Multiple
Whether mottling was observed	Mild Mottling	No	No	No	No	Faint markings	No	No	No	No	No	No
Place of origin of Teeth . .	Kinloch-leven	Fort William	Onich	Isle of Lewis	Inver-lochy	Inver-lochy	Murray Hill, Glasgow	Alyth, Perth-shire	Kinloch-leven	Greenlaw Berwick-shire	Inver-lochy	Inver-lochy
P.P.M./F. .	1000* Whole tooth	440† Average	580‡	690* Whole tooth	300‡ Average	500† for $\lvert 6$	245‡ for $\underline{7\rvert}$	408‡	112‡	260‡	170‡	232‡
P.P.M./F. in water . .	0·10	0·15	—	—	0·18	0·18	—	—	0·10	—	0·18	0·18

* Pounded in Mortar. † Cut with Steel Burr. ‡ Cut with Diamond Disk.

N.B.—If Fluorine is deposited in the teeth as CaF_2, then to obtain the *total* approximate impurity, multiply all results by 2.

ADDENDUM

The author believes that under certain conditions, an inverse relationship between a water supply containing fluorine and dental caries may exist. It was stated (Dillon, 1950) that 16 p.p.m. sodium fluoride could inhibit lactic-acid fermentation in a calcium-free medium, whereas calcium fluoride had no effect. Pincus (1949) found that potassium fluoride could inhibit Gram-negative bacillus

isolated from carious teeth in concentrations as low as 3 p.p.m. In certain natural water supplies, fluorine ions in excess of that balanced by calcium ions may be found, in which case the enzyme processes necessary for lactic acid fermentation may be inhibited, provided nothing is added to the diet in excess or used in the mouth to nullify this slight effect or to encourage the process of lactic-acid fermentation, but wherever fluorine ions are in excess of calcium ions mottling of teeth and bone will be a feature.

If lactic-acid fermentation is going on actively in the oral cavity it matters not whether the teeth are well calcified or poorly calcified, or whether "hardened" by fluorides; it is only a question of time and the rate of acid fermentation, before the inorganic superstructure is breached, permitting the microbes to enter the basic organic structure, and from then on the process is one of progressive protein hydrolization, and the only way to inhibit it is to find some safe way of controlling fermentation.

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A NEW DENTAL HOSPITAL OPENED

THE new Oral and Dental Hospital of the University of the Witwatersrand was officially opened on Sept. 10, 1952, by His Excellency the Governor-General, Dr. E. G. Jansen. An impressive academic procession preceded the opening ceremony at which speeches were delivered by Dr. Jansen, Dr. F. E. Kanthack, Vice-President of the University Council, and Dr. T. B. Berry, Acting Dean of the Faculty of Dentistry. A golden key was presented to His Excellency by Professor G. Pearse as a memento of the occasion.

In his speech the Governor-General referred to the rapid progress of dental education in South Africa since the inception of the Dental School in 1925. He regretted the absence overseas of Professor J. C. Middleton Shaw, Dean of the Faculty of Dentistry, who had played so large a part in this development. The hope

His Excellency the Governor-General, Dr. E. G. Jansen, speaking at the opening ceremony.

was expressed that the new hospital would continue to serve the public needs and would further the cause of health among the community.

After declaring the building open His Excellency spent an hour on a tour of the new hospital, accompanied by Mrs. Jansen, the Mayor and Mayoress of Johannesburg, Councillor and Mrs. I. E. Attwell, the Principal of the University, Dr. H. R. Raikes, and members of the University Council and academic staff.

THE PROCEEDINGS OF THE BRITISH SOCIETY OF PERIODONTOLOGY

President: G. H. LEATHERMAN, F.D.S. R.C.S. Eng.
Hon. Secretary: H. THOMSON, L.D.S. R.F.P.S. Glas., H.D.D. R.C.S. Edin.
53, Portland Place, London, W.1.

Vol. III, No. 1 November, 1952

PRESIDENTIAL ADDRESS

(*Delivered at the commencement of the Fourth Session, on October* 8, 1952, *at the Eastman Dental Hospital*)

Ladies and Gentlemen:

It is hard to realize as I stand before you that we are at the beginning of our fourth year of existence, and I think it would be apt to take stock—see what we have accomplished, where we stand, and what we can hope and strive for in the future.

Our first meeting took place on July 19, 1949, so that we have had three Sessions of meetings comprising fourteen meetings and three Annual General Meetings in all, and we have held these at all the Dental Hospitals in London, and have visited the Dental Schools at Manchester, Birmingham, and Newcastle.

Our meetings, as one would expect, have kept closely to a periodontal basis, and on reflection the subject-matter and discussions have been of sound educational and clinical value.

Our Clinical Meetings have set a high standard and are obviously of great interest and value.

Our proceedings are published monthly, and this year you will have received a small bound reprint of the last Session's papers, which should be useful for reference. Finally we have, if I may say so, a very excellent programme planned for this Session.

Our membership, including those members elected to-day, consists of 32 Full Members, out of a possible maximum of 40, and 57 Associate Members, and I would call your attention to the fact that amongst the Full Members are included the teachers and heads of Periodontal Departments of nine of our Dental Schools. Our Associate Members, I assume, are those general practitioners with a special interest in the practice of Periodontia, yet, Ladies and Gentlemen, our average attendance at meetings is 11 Full Members and 10 Associate Members, which for a specialist Society is, in my opinion, a very low figure; and it will be one of my purposes whilst your President to try and improve this record, for as I wrote in my recent letter to every member, we have no justification for existence if our members don't attend meetings and take part in the discussions.

So much for meetings and membership. Now what have we accomplished? Well, first and foremost in managing to exist for three years it means that our constitution is standing the test of time—we are solvent—and our membership is growing. We have been instrumental in getting the tax on toothbrushes removed. One of our members has perfected the techniques for, and advised on the production of, an electro-surgical unit, which personally speaking I find of the greatest advantage in clinical practice. Some of our members are having an influence on the shape and texture of toothbrushes. Our advice has been sought on the production of films dealing with Dental Health. We are giving scientific backing to an Oral Hygiene Service which is financed and set up by commercial interests.

This last step is an important one of policy, and is, I think, a wise and correct one, in that one of our prime objects must be to educate the public in dental health measures. We, as a profession, can't afford to do this, but commercial interests can, and it is up to us to support them by seeing that the right kind of material, both as to form and scientific exactness, is published.

We have had three Study Groups in existence for two years. One on Instruments, one on Occlusion, and a third on Nomenclature. These in my opinion have not been a success. No real continuous work has been done, and no conclusions drawn worthy of the product of an active Study Group. I am not suggesting this is the fault of the members of the Study Group, but rather that the whole system of setting up these groups and expecting concrete and practical results may be wrong.

Last, but not least, we have sponsored the Gibbs Travelling Scholarship, a generous gesture on the part of Messrs. Gibbs, who financed a visit to investigate the practice and teaching of Oral Hygiene in the Scandinavian countries. This scholarship was won by Mr. P. M. G. James, whose report will form the subject-matter of one of our extra meetings this Session, for you will probably have observed that we have two extra meetings on our programme.

I think I can also disclose that Messrs. Gibbs are very favourably disposed towards the setting up of a second Scholarship for a three month's visit to the United States next year.

I should also mention that we have as a Society presented a Scientific Exhibit at the XIth International Dental Congress lately held in London, and this same exhibit was shown at the Annual Meeting of the British Dental Association held in Cardiff in September. This exhibit was beautifully produced, and created great interest and favourable comment, especially from our colleagues in the States.

I'm not suggesting that we should be satisfied with our accomplishments, but they do at least allow me to say that we are active, and anxious to promote the maximum amount of interest amongst the profession and the public in our branch of dentistry.

So we can now put the question—"where do we stand?", and I would suggest the reply might be, we are a Society reasonably well established for our age, financially sound, in that we have no debts, and with a moderately active membership. We have, of course, had no time to establish a traditional background, nor have we had a policy of action, and in assessing our present position, I put the question to you—"have we justified our existence and is it worth while carrying on?", for the view is only too often expressed that there are too many Dental Societies already, each one necessitating an extra subscription and more meetings, and I think it is no secret to say that some of us have been asked why we couldn't have organized ourselves as a Periodontal Section within the British Dental Association, and why should it be necessary to have a separate society. My personal answer has been that we have justified our existence and that we intend to do so even more in the future.

Which brings me to my next question—"What can we hope and strive for in the future?", and of course what follows must necessarily be my personal ideas.

I think it will be agreed that the study and practice of periodontia until comparatively recent years has played little or no part in the teaching syllabus of our dental schools in Great Britain. There were no separate departments, no special teachers, very little time allowed in the training programme, and no tests of a student's knowledge of periodontia made in the examinations for qualification as Dental Surgeons. I would go so far as to say that the course of training received by a Dental Hygienist in the R.A.F. Dental Branch during the war years was better than the training in periodontia given to dental students in any dental school in this country at that time. That situation is, as you all know, changed very materially and every School now has its Periodontal Department with one or more teachers attached, and the newly qualified Dental Surgeon is equipped with a better knowledge of the basic principles of periodontia

than ever before.* The pathetic thing is that with present conditions of general dental practice as they are, he has very little encouragement to put his periodontal training into practice—but more of that aspect later.

Most of the teachers are young and enthusiastic and are doing splendid work, but I regret to say with no apparent unity of thought as to a common syllabus—an accepted nomenclature or classification—an accepted method of instrumentation with an agreed instrument pattern—a common basis for diagnosis and treatment. Why, there isn't even agreement as to the pattern of a toothbrush and its correct method of use. As a consequence, whilst our younger generation of dentists have more knowledge and consciousness of the importance of periodontia, it depends on the School they have received their training from as to their understanding of terms and methods of practice.

I maintain that one of the foremost tasks of this Society is to try and remedy this by bringing the teachers of periodontia together, and to encourage them in every way possible to agree to a common pattern. The Council, realizing this, are trying to arrange a meeting along these lines to take place in the evening after our meeting on December 10, and I do sincerely hope that the teachers will give this their support and attend this meeting. We have written to the Deans of every School asking for their support.

I am even going further and want to suggest a basis on which we might all try to achieve unity of thought about the teaching and practice of our speciality—though I dislike that word, for periodontia is not a speciality; it is and should be the basis of all dental conservative procedures and the cornerstone around which all practices are built.

I would call your attention to the June and July, 1952, issues of the *Journal of the American Dental Association*. These two issues present an appraisal of present scientific information concerning periodontal disease, and consist of papers presented and the conclusions drawn at an inservice training course conducted at the University of Michigan School of Public Health and School of Dentistry, Ann Arbor, Michigan, September 10–15, 1951.

In the June issue are twenty papers by men prominent in their respective fields, covering every known aspect of the subject of periodontia, from terminology to the relation of operative and prosthetic dentistry to periodontal disease.

It is possible that this publication may become recognized as a reference volume on periodontal disease, for it contains all that is known and acknowledges much that is unknown in this all too prevalent human disorder.

The conclusions of the 200 participants in the conference are presented by five evaluating committees in the July issue and represent an unbiased opinion and indicate where there is need for more scientific investigation of the subject.

There is also a very valuable bibliography given at the end of each of these reports, e.g., the report on the behaviour of gingival and supporting tissues has a bibliography of 133 different publications of a wide origin. I want to make a plea that we as a Society ask the teachers of periodontia in Great Britain to consider this valuable material as to its suitability for use as a basic text for the teaching and practice of periodontia. The terminology and classification of periodontal disease which are used are simple and straightforward, and I am sure you all realize that it is these two fundamental points which are the main stumbling block to unity of thought in periodontal teaching.

The American Academy of Periodontology has been trying for years to establish a universally accepted nomenclature without success, and I suggest if we arbitrarily accept some basis which we can all use, that within a few years, with a few corrections here and there, we shall have established a common and accepted background on which to teach and practise periodontia.

I can imagine many of my listeners and more of those who may read this address saying—

* Reference was made here to the publication by the General Medical Council of Recommendations concerning the Dental Curriculum in which periodontal disease is specifically mentioned as a subject, for written and possible practical examination.

" this is all very nice in theory but it isn't practical". My reply is that if we think it is worth trying, we can make it practical. Just imagine the value and the importance to dentistry if every dental student in the United Kingdom was receiving a training in periodontia based on a common nomenclature and classification, and furthermore that members of this Society accepted and used a similar basis. It is worth striving for, Ladies and Gentlemen, and I believe we have the means with which to start.

Next, I want to talk about the relationship of periodontia to other branches of dental practice, such as the science and practice of orthodontics, of partial prosthesis, of conservative dentistry; and I want to suggest that a part of our future policy be one of better liaison with other associations and specialist societies, so that our programmes include speakers mainly interested in their own branch of dentistry, but interested in the periodontal link-up with their work—for example, you find our current programme is devoting one meeting to the correlation of orthodontic and periodontal problems, to be presented by Miss K. C. Smyth on Wednesday, March 11, 1953.

In a similar way I feel that many of our members should be willing to speak before other Societies, presenting the subject of periodontia in a manner that would, for example, interest a group studying partial prosthesis.

Thirdly, I want to press for the training of more and more dental hygienists. At present the only course available is the one established in this Institute by the Ministry of Health and which is capable of taking about 45 women per year and training them exclusively for work in the Public Health Service of the country. Ladies and Gentlemen, we need hundreds of dental hygienists, and we need them in private practice just as much as they are required in hospitals and clinics—though I would always agree that the latter had priority; but the facts are that our colleagues in general practice, and especially those dealing with National Health Service patients, find it economically impossible both from the point of view of time and money to carry out sound periodontal treatment on their patients. I spend well over a third of my practising hours every year scaling and polishing teeth and teaching patients how to take care of their teeth, and I feel sure this demand exists with the patients of every practice. What a splendid thing it would be if we had dental hygienists to help us with this important but routine work. We should as a Society press for increased training facilities—a bigger output—the setting-up of Oral Hygiene Clinics with a number of hygienists working under the supervision of recognized consultants in periodontia, and later the provision of dental hygienists for private practices.

This form of ancillary has been encouraged by the Ministry of Health, accepted by the British Dental Association, and is legal under the present Dental Act—so why not make full use of this valuable help, and who better to press the point than this Society.

Fourthly, I feel that we should give every assistance possible to those who are attempting to get the purchase tax on dentifrices removed. We recognize it is advisable for some form of toothpaste or powder to be used in conjunction with a toothbrush for more effective mouth hygiene, and it is only logical to suggest that if we feel we have been successful with our efforts by the removal of the tax on toothbrushes, then we should strive for the removal of a similar tax on dentifrices.

Lastly, I want to make a plea to you, Ladies and Gentlemen, to help us build our Library. You must all have reference books dealing with Dental Subjects which influence the study and practice of Periodontia. Will you look through your bookcase and let our Secretary know of any books you would be willing to donate to our Library ? This applies to Journals as well, and especially those dealing with periodontal subjects. Everything has to have a beginning, and I do sincerely ask for your support in building a worthy reference library for our Society. Where it will be housed and how it can best be used will present no insuperable difficulty, if we have the material.

In conclusion, Ladies and Gentlemen, I am inspired by some words of Sir Heneage Ogilvie,

Issued with "The Dental Practitioner", November, 1952, Vol. III, No. 3

RADIOGRAPHIC CHART No. 6.

THE DIAGNOSIS OF BURIED ROOTS

A

B

Buried roots may be a constant source of trouble to a patient, as well as leading to a possible seriously infected area. A radiograph is usually the only means of detecting them, and their removal is essential.

A, Shows two buried roots of a lower first molar; B, Shows a buried root in the $\underline{56}$ region.

Consulting Surgeon Emeritus to Guy's Hospital, in his last clinical lecture delivered on July 8 of this year. He said, speaking of recent advances in surgery, "What is recent is seldom an advance, and what is an advance is seldom recent. Of all the articles that are written in all the journals of all countries in a year, the majority record no more than a passing fad. What is new is seldom sound, but what is old is at any rate sound enough to have survived the attacks of several generations of novelty hunters. A new discovery is only an advance when it has been tested and tried and consolidated into a firm basis from which further advances can be made".

I want to suggest that the teaching and practice of periodontia be based on the simple and tried principles of a thorough knowledge of the tissues involved—a careful diagnosis—painstaking treatment—and the continuous and constant co-operation of the patient. There are no short cuts to successful and lasting treatment, and I am appalled at the present-day tendency to encourage the destruction of gingival tissue by gingivectomy for pocket elimination and of tooth structure by grinding to produce a so-called balanced occlusion. Both procedures have their place, but they are not short cuts to a painstaking and thorough scaling of every surface of a tooth, the removal of all forms of irritation, and the establishment of a sound practice of Oral Hygiene by the patient. These simple measures alone will do more to eliminate periodontal disease than any others that I am aware of.

Well, Ladies and Gentlemen, I have given you my ideas of a future programme and policy for this Society. You may agree or disagree with some or all of my suggestions: my answer is—send us better suggestions with a practical application and I for one will welcome them and withdraw my own.

I believe any Society to justify its existence must have an active membership interested in promoting a practical and progressive programme, and having been paid the honour of being elected as your President for this coming year, I shall do my utmost during my term of office to justify your confidence by establishing such a programme, but your Council and myself must have your full co-operation.

NATIONAL HEALTH SERVICE NOTES

Annual Report

DESPITE financial restrictions, a steady expansion of the National Health Service in England and Wales is traced in the Ministry of Health's Annual Report covering the 21 months from April 1, 1950, to December 31, 1951.

GENERAL DENTAL SERVICES

Demand for dental treatment under the general dental services continued to be high. Following the introduction of charges for dentures on May 21, 1951, there was a substantial reduction for false teeth, but the demand for conservative treatment continued to increase gradually. An appendix shows that the average cost to public funds of a course of treatment dropped from a peak of £5 16s. 0d. to £2 14s. 0d. at the end of 1951. For 1950, applications for courses of treatment notified to the Dental Estimates Board totalled 7,179,000 and claims for emergency treatment 1,982,000. The figures were 6,860,000 and 2,732,000 respectively in 1951.

The number of dentists taking part in the general dental services rose from 9,495 on December 31, 1949, to 9,657 on December 31, 1950, and to 9,694 at the end of 1951. During 1950 the apparent net gain to the Dental Register was 275, and in 1951 it was 224. "These net gains, small as they are, even so are probably over-stated, and the slow rate of recruitment gives rise to some disquiet, particularly when the high average age of the profession is taken into consideration."

The period covered by the Annual Report has now been changed from the financial to the calendar year, thus placing it on a uniform basis with that of the Ministry's Chief Medical Officer, and with most of the statistics other than those relating to finance.

S.I.M.A. Supplement to
The DENTAL PRACTITIONER *Vol.* III, *No.* 3

OFFICIAL SUPPLEMENT OF THE

SURGICAL INSTRUMENT MANUFACTURERS' ASSOCIATION (INC.)

DENTAL LABORATORIES SECTION

Chairman : E. G. EMMETT, F.I.B.S.T.
Administrative Offices : 6, HOLBORN VIADUCT, LONDON, E.C.1
Telephone: CITY 6031

Vol. II, No. 8 November, 1952

Editorial Committee: D. M. BEAUCHAMP; H. J. POTTER, F.I.B.S.T.

EDITORIAL

THE well-attended congress at Nice of our French counterparts seems to have been very successful. In spite of the background problems common to our business the world over, there has emerged an expression of the desire to establish a permanent international exchange for the translation and publication of technical articles, to explore means for periodical meetings and exhibitions, to take account of legislation affecting our industry, to raise the cultural and professional level, and to exercise stricter control over entry into our craft. The aspirations of our French friends are shared by thoughtful laboratory men in all countries.

The recent invitation received to share some of the committee work at the British Standards Institution should convince laboratory owners, large and small, that our association is expected to make a contribution as a responsible body, representing an important section of the dental sphere.

The importance of cohering by all possible means during this difficult time has been recognized and provided for by the arrangements made for the closing meeting of the week-end conference next February.

In an endeavour to promote and maintain interest in every member, each Branch is to supply a table with specimens of members' workmanship. Individuals who are not members of a Branch are also urged to exhibit examples of their skill in any field. Specimens of prostheses, for mutual help, and examples of hobbies, for mutual interest, are to be included. There will be overflow tables devoted to the display of members' chrome cobalt castings, stainless steel pressings, porcelain work, and other classes if sufficient in number.

It will be remembered that a collection of cigarette cards displayed by a courageous dental surgeon at the 1947 Bournemouth B.D.A. meeting attracted much attention. One of our members is already highly esteemed for his sketches and cartoons.

OCCLUSAL RESTS

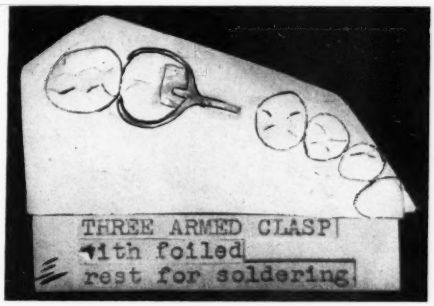
By **L. HEYDERMANN**

ONE of the most essential requirements in partial denture construction, and one too often neglected, is the use of occlusal rests. Most partial dentures, unless they are very large with only a few of the patient's teeth remaining, should be at least partially tooth-borne. When the skeleton type of partial denture is considered, consisting of bars and very narrow saddles, occlusal rests are essential.

Occlusal rests act by their resistance to the forces of mastication. To sum up their advantages: they maintain the denture in occlusion

with the opposing teeth, aid retention and stabilization, and protect the hard and soft tissues of the mouth.

By preventing undue pressure on the soft tissues, the associated resorption of the underlying bone is retarded, and stripping of the gum from the standing teeth by settling of the denture is prevented. Occlusal rests form an efficient contact between the denture and abutment teeth, so preventing the packing of food debris which leads to pocket formation in the gum and decay of the teeth. As mentioned above, it is only by use of occlusal rests that it is possible to construct a skeleton denture so that a minimum of soft tissue is



Platinum foil burnished to tooth under rest, then space filled with solder.

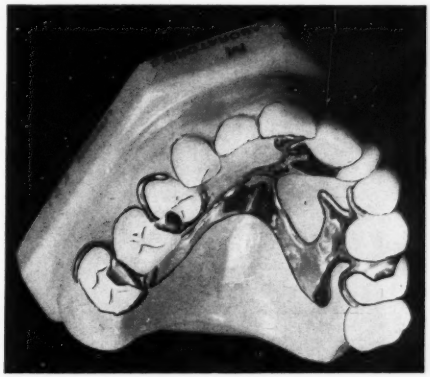
covered. It is often found clinically that, where tissue-borne partial dentures are worn, the underlying mucosa is chronically inflamed and clearly differentiated from uncovered tissue. This inflammation is most noticed where the masticatory pressure is greatest.

Rests further protect the teeth by acting as reciprocal bearings to the clasp arms. This function is especially important when Roach bar clasps are being used.

By maintaining the clasp arms in their correct relation to the teeth, the occlusal rests aid retention of the denture. The stability of the denture is improved by preventing rotation about points remote from the teeth on which rests are placed. In this way the rests act as indirect retainers.

There are, of course, certain difficulties and disadvantages which have been held as an argument against the use of occlusal rests. In most cases a remedy for these difficulties is to be found.

Decay of the tooth substance beneath rests is largely prevented by assuring a good fit.



A typical use of occlusal rests.

This may be obtained either by casting the rests, or by soldering wrought wire to gold or platinum foil which has been burnished to the model.

Interference with the normal occlusion is prevented by preparation of the teeth in the mouth. If the marginal ridge of enamel of a tooth is reduced in height so that there is a shallow, saucer-shaped depression, bending or

fracture of the occlusal rest is prevented because there will be extra thickness of metal at its angle.* For this reason it is the grinding of abutment teeth, or of the fillings in them, which is recommended.

Lastly, the placing of excessive strain on the teeth must be considered. The teeth

* Mr. Heydermann would seem to have an important point here. In our view there are a number of teeth which could do with preparation of some kind.—Ed.

chosen to support the denture must be strong and sufficient in number so as to distribute the load on them. Especially in the free end saddle type of denture, stress breakers may have to be used.

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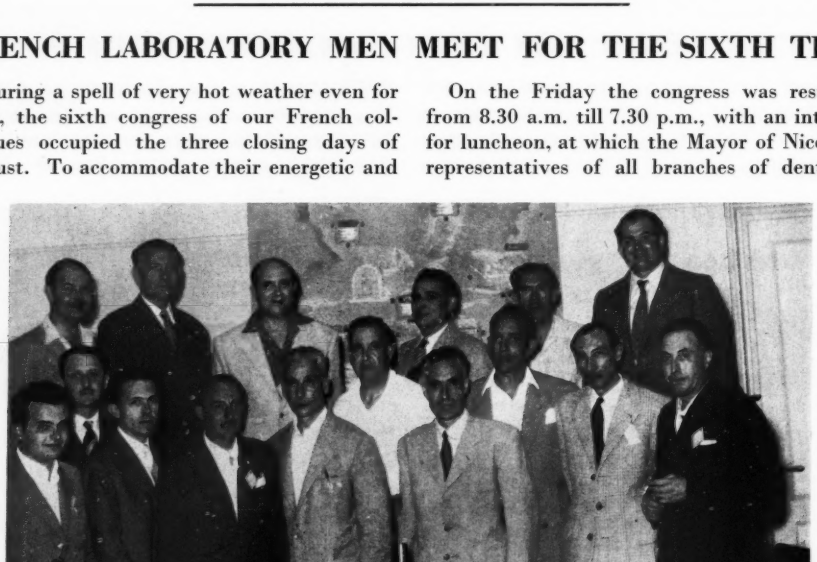
FRENCH LABORATORY MEN MEET FOR THE SIXTH TIME

During a spell of very hot weather even for Nice, the sixth congress of our French colleagues occupied the three closing days of August. To accommodate their energetic and comprehensive programme, the meetings commenced early each day.

On Thursday, August 28, at 8.30 a.m., the main committee and local members of Nice received the delegates from all over France, Italy, and Belgium at the Chambre de Métiers, 23, Boulevard Victor Hugo. The main committee then had a three-hour conference. At luncheon toasts were made to the presidents of the Chambre de Métiers (trade association) and the Union Départementale des Artisans (small manufacturers of S.E. France). The congress was opened at 3.0 p.m. by an address of welcome by the local chairman.

On the Friday the congress was resumed from 8.30 a.m. till 7.30 p.m., with an interval for luncheon, at which the Mayor of Nice and representatives of all branches of dentistry were entertained. This day was terminated by a banquet which commenced at 8.0 p.m.



Top: M. Coudray, M. Lecerf, M. Segghetini, M. Drouhin (*President*), M. Perrott, M. Ridoux, M. Mund. *Bottom*: Four Italian prosthetists from Turin; M. Deschamps, M. Duvaudie (*Vice-President*), M. Tarquin, M. Oosterbosch (*Vice-President of the Belgian Association*), M. Boulanger.

The Saturday was devoted to sight-seeing. At 8.30 a.m. a large party left in a convoy of cars for Cannes. On arrival they embarked for a trip to the Lerin Islands; returning from this they enjoyed a reception by the Cannes members. Then came departure for the town of Grasse, famous for the essential oil raw materials for perfume. Following lunch, one of the perfume factories was visited.

M. and Mme. Segghetini and M. Bovis were accorded an enthusiastic vote of thanks for their perfect organization of the activities.

NEWS FROM HEAD OFFICE

Our Chairman's Illness.—Members will be glad to learn that our Chairman, Mr. E. G. Emmett, is making satisfactory progress after his recent operation, and hopes to resume his normal activities in the near future.

Representative on Council of Management.—Mr. H. J. Nowers has been elected representative of the Dental Laboratories Section on the Council of Management of S.I.M.A. in place of Mr. W. F. Lucas, who felt obliged to tender his resignation owing to difficulty in attending the meetings. We are indebted to Mr. Lucas for filling the gap during the past few months and appreciate Mr. Nowers's willingness to undertake this further service.

Representation of S.I.M.A.—In order to relieve our Chairman of some of the very arduous work which has devolved upon him, the possibility of sharing the duties of representation on the various bodies with which S.I.M.A. is associated is being explored, and any offers of assistance from members who are willing to devote some of their time to forwarding the interests of the Craft in general would be most cordially welcomed. In the meantime the London Regional and Croydon Branches are giving the matter earnest consideration with a view to finding some satisfactory solution to the difficulty.

The Dentists Bill.—There have been no further developments in connexion with the Bill, and it now seems doubtful whether it will be proceeded with in the House of Commons next session. A further approach has been made to the B.D.A., and a meeting of representatives of both organizations has been arranged to explore the possibility of any useful joint action with regard to the ancillary worker clauses in the Bill. Further representations are also being made to the Parliamentary Medical Committee by our Branches at a later stage.

Group Insurance Scheme.—A group insurance scheme to cover members against the liability which might arise under the N.J.C. regulations in the event of the continued absence through sickness of any of their employees, has been recommended to members, but this can only be proceeded with on a group basis if sufficient support is forthcoming.

Ratio of Apprentices.—Some of our members may be concerned at the position which has arisen from the disturbance of their ratio of apprentices through the dismissal of technicians on account of shortage of work. We are advised, however, that the ratio is understood to be that which existed at the time the apprentice was engaged and the fact that there has been a prejudicial change does not require the employer to make other arrangements as this would involve breaking the apprenticeship indentures in order to adjust the ratio. No further apprentices may, however, be taken on until the ratio has adjusted itself.

British Standards Institution.—The first meeting of a committee to deal with dental acrylic resin materials took place on September 23, when Mr. D. M. Beauchamp attended to represent S.I.M.A. The first meeting to consider the standardization of dental tools and laboratory equipment was held on September 30, when Mr. C. M. Booth and Mr. H. J. Potter gave their time to serve the Association. Members will be advised in due course of any developments arising from the discussions, and will be invited to submit suggestions when further information is available.

Demonstration of "Swedon".—The Association has been invited to co-operate with Henry Courtin & Sons, Ltd., in a demonstration of the quick-curing acrylic "*Swedon*" and it has been agreed that this shall take place under the auspices of S.I.M.A. The new Myerson colour film on Dura-Blend Teeth will also be shown. Further details will be published later.

Membership.—Messrs. Wm. Vincent Toft & Sons of Perth, hitherto affiliated members, have now been elected to full membership of S.I.M.A.

Changes of Address.—The following alterations in addresses should be noted:—

Ronald A. E. Hosking, The United Dental Laboratories, 144, Claremont Road, Manchester, 14.

S. W. Newman, 49, Wimpole Street, London, W.1.

BRITISH STANDARDS INSTITUTION

ACRYLIC RESIN MATERIALS

Our Association was represented at the preliminary technical committee meeting on September 23, convened to consider the preparation of British Standards for acrylic resin materials.

Delegates attended from the Ministry of Health, the British Dental Association, the Association of Dental Manufacturers and Traders, the three Services, and many other interested bodies. Dr. H. M. Glass introduced the business on hand, and later Professor John Osborne was unanimously elected to the chair.

A preliminary draft of the sub-committee which was formed will be circulated to all concerned and comments invited. Comments received will be considered by the committee, decision made on useful comments, and the original draft amended as necessary. Finally the specifications will be passed to the Industry Committee for publication.

DENTAL TOOLS AND EQUIPMENT

At the meeting of this technical committee Mr. C. M. Booth and Mr. H. J. Potter represented the Association. Professor Fenn was elected chairman, and some time was devoted by the committee to studying its "terms of reference".

It was then decided that clinical instruments such as chisels, elevators, and similar cutting instruments should first be considered, and a sub-committee was set up to study this problem and to report back.

Handpieces were discussed, and it was recognized that such a piece of equipment was as difficult to standardize as a motor-car, but it was generally agreed that if information could be gathered as to the faults and causes of the most common breakdowns of available handpieces much could be done towards their elimination. Members are therefore asked to consider this problem and to send their views to Head Office.

OBITUARY

It is with deep regret that we inform our members of the passing of Mr. W. J. Horsfield, on Oct. 12, at the early age of fifty years.

He founded his laboratory over thirty years ago in the West End of London, after serving an apprenticeship to a well known dental surgeon in that district.

He was a founder member of the old Laboratory Owners' Association. His laboratory will continue, although his colleagues and clientele will miss this outstanding craftsman.

Our profound sympathy is extended to his wife and family.

NEWS FROM THE BRANCHES

West of Scotland Branch.—At the last meeting, the February week-end conference was discussed, and special consideration given to the closing meeting. Mr. W. W. Robertson and A. B. Rae were appointed to look after their proposed table show of work, special tools, and hobbies. Though Mr. Fountain cannot bring his model railway, they are determined that their table will be even more interesting than it was last year.

S.I.M.A. (DENTAL LABORATORIES SECTION) DIARY

South Wales and Monmouthshire Branch (*Hon. Secretary*: Mr. R. Mather, 16 Clodien Avenue, Cardiff).—Thursdays, Nov. 6 and Dec. 4, at the Royal Hotel, Cardiff.

Birmingham Branch (*Hon. Secretary*: Mr. G. Taylor, 310, Ridgacre Road, Birmingham 32).—Meeting, Oct. 29, at Birmingham Chamber of Commerce.

West of Scotland Branch (*Correspondent*: Mr. Alex. B. Rae, 139, Cleveden Road, Glasgow).—Meetings on the third Monday of each month at the Bath Hotel, Glasgow.

Croydon Branch (*Hon. Secretary*: Mr. H. J. Nowers, 86, Croydon Road).—Meeting, Nov. 21, 7.30 p.m., at the Six Bells, Handcroft Road.